REMARKS:

The Examiner rejected claims 1–5, 8 and 15 under 35 U.S.C. 102(b) as being anticipated by Nebolsine (US Patent No. 4,128,477). Claims 6, 7, 9–14 and 16–23 were rejected under 35 U.S.C. §103(a) as unpatentable over Nebolsine in view of Maxson (US Patent No. 5,156,738).

RESPONSE TO CLAIM REJECTIONS UNDER 35 §USC 102

NEBOLSINE TEACHES AWAY FROM APPLICANT'S INVENTION

Claims 1–5, 8 and 15 were rejected under 35 U.S.C. 102(b) as being anticipated by Nebolsine (US Patent No. 4,128,477). In paragraph 2, the Examiner states: "Claims 1–5, 8 and 15 are rejected ... as being clearly anticipated by Nebolsine. See col. 1, lines 6, 11, and 35; col. 2, line 31; col. 3, line 2; col. 4, lines 2-3, 35-37 and 53-54; col. 6, line 19-21 and 35 –38; col. 7, lines 10-11, 14, 23-24, 5-56 and 62; col. 8, lines 21-23; and col. 9, lines 17 –19."

Nebolsine neither expressly or inherently contains, within its four corners, every element of the claims in question. Specifically, Nebolsine does not disclose a deep bed filter for processing raw, untreated sewage without prior processing. The Nebolsine method teaches multiple pre-treatments of sewage prior to delivering the sewage to a ultra high rate (or deep bed) filter 9. *See '477, col. 5, lines 11-26 and lines 32-36.*

The Nebolsine method comprises the following steps before the treated fluid is piped to the filter 9:

1. removing dense suspended particulate materials from said fluid;

2. passing said fluid through a fine mesh screen, which is between 20 and 60 mesh;

3. introducing a coagulant composition to said fluid to promote coagulation of colloidal size particles in said fluid, said coagulant composition

comprising a member selected from the group consisting of an alum composition, a polyelectrolyte, or mixtures thereof;

4. filtering said fluid containing said coagulated particles through a deep bed multi-media filter to produce a filtrate essentially free of particles between about 1 micron and about 70 microns; *see '477, claim 1.*

The '477 patent requires a first screening of dense particles through a bar rack and degritter, *see '477, col.4, lines 1-4.* Then the '477 patent requires a second screening through drum screens comprising fine mesh screen of No. 20 mesh to No 60 mesh. The writer of the '477 patent defines the No 20 mesh as being equal to 2 squares per inch and the No 60 mesh equal to 60 squares per inch. This is an obvious error. Please see attached documentation, The Handbook of Chemistry, page 707, US Sieve Series which illustrates that Sieve No. 20 mesh is equal to 20.16 meshes per lineal inch. The method taught by the Nebolsine patent requires a narrow drum screening process that "will remove particles which are larger than 70 microns in order to protect the ultra high rate filter media." *See '477, col. 5, lines 19-21.*

Moreover, step 3 of Nebolsine's method, as claimed, requires

> introducing a coagulant composition to said fluid to promote coagulation of colloidal size particles in said fluid, said coagulant composition comprising a member selected from the group consisting of an alum composition, a polyelectrolyte, or mixtures thereof; *see '477, claim 1.*

Applicant's method teaches direct filtration of raw sewage by piping raw, unsettled wastewater directly to a deep bed filter with merely course screening prior to entering the filter. *See Application, Test Procedures and Figures 1 and 2.* Degritting is optional and the step of coagulation is neither used nor even discussed under Applicant's method.

Applicant method as claimed is:

> A process for removing BOD and suspended solids from a high volume wastewater stream comprising:

1. piping high volume, raw, unsettled wastewater directly to a deep bed filter without pretreatment in a facultative zone;
2. filtering the high volume, raw, unsettled wastewater by filtration through the deep bed filter; *Application, claim 1.*

In contrast to Nebolsine, Applicant's invention, as claimed, teaches a direct filtration process in which raw sewage wastewater is piped to a deep bed filter without any treatment other than course screening. Course screening in Applicant's method utilizes a bar rack with ½ inch openings between the screen or a wire mesh screen with 6.0 mm openings. *See Application, page 5, line 25 to page 6, line 2., see also, Test Equipment, page 9, lines 1-7.*

Advantageously, Applicant process is a self-filtering process. By retaining fibrous material within the filter, colloidal BOD is removed along with suspended solids. *See Application, page 8, lines 18-23.*

Nebolsine teaches away from Applicant's method because Nebolsine requires narrow screening using No. 20 to No. 60 wire mesh resulting in the removal of particles larger than 70 microns. *See '477, col. 3, lines 11-26.* Nebolsine states in lines 24-26, "Accordingly, an important aspect of the present invention is to conduct effective narrow screening operations.

Nebolsine does not state or suggest either in the specification or claims, Applicant's process for the treatment of raw sewage that does not require multiple pre-treatments of raw wastewater. Further, the deep bed filter of Nebolsine is designed to treat water or other liquids containing a concentration of suspended matter on the order from 20 to 500 milligrams per liter. *Col. 7 lines 20-22.* The direct deep bed filter of the present invention is able to directly treat raw wastewater, including that which has not been first prescreened down to less than 70 microns or treated by chemical coagulation as required by Nebolsine.

RESPONSE TO CLAIM REJECTIONS UNDER 35 §USC 103

NEITHER NEBOLSINE NOR MAXSON, ALONE OR TOGETHER TEACH APPLICANT'S PROCESS.

The Examiner has rejected claims 6, 7, 9–14 and 16–23 under 35 USC §103(a) as unpatentable over Nebolsine in view of Maxson (US Patent No. 5,156,738). Applicant respectfully traverses this objection. Applicant requests that the Examiner reconsider and withdraw the above rejection of the claims in view of the following:

Applicant respectfully submits that nothing in the art of record teaches or suggests the present invention. For the reasons stated above, Nebolsine does not disclose the claimed invention, and neither expressly or inherently contains, within its four corners, every element of the claims in question. Nebolsine's method requires 1) prescreening prior to filtration through a narrow screen process, having several screening steps, including screening through a drum screen until the remaining sewage particles are down to a size less than 70 microns and 2) pre-treatment by chemical coagulation. *See '477, col. 5, .lines 10-55.*

The Examiner states it would have been obvious to backwash the filter bed of Nebolsine in the manner of Maxson, since this secondary reference teaches that filter beds are typically backwashed in this manner. However, "Because the combined depth of the filter beds is much greater than has been employed in the past, special backwashing facilities are provided to afford adequate cleansing of the media." '477, *Col. 7, lines 34 – 37.* Therefore, it would not have been obvious to combine a typical backwash procedure for a filter bed requiring special backwashing facilities.

The Examiner further states it would have been obvious to one to "include an additional air only backwashing treatment after the water backwashing treatment in the thus modified primary reference, in order to promote the destruction of BOD components in the sewage undergoing treatment. Such modification is deemed to

be especially obvious in view of the disclosure by Nebolsine that air may be added to the filtrate from the deep bed filter, in order to increase its level of dissolved oxygen."

Nebolsine adds air to the filtrate "In order to raise the level of dissolved oxygen in the filtrate prior to its introduction to the sea" by treating the filtrate with atomized air within the confines of the outfall pipe. However, Nebolsine is not concerned with maximizing the destruction of BOD components in the discharge:

> One of the basic aims of sewage treatment had always been to limit the concentration of BOD (i.e., compositions which have a Biochemical Oxygen Demand) so as not to excessively deplete the dissolved oxygen in the receiving water body. However, due to the different ecological conditions encountered in confined fresh water bodies and the open sea, it is not necessary to adopt the same stringent BOD concentration limits for discharges to the sea and higher levels can be tolerated. *'477, Col. 8, lines 31 – 39.*

In contrast, the use of air backwashing in the deep bed filter in Maxson is for filter cleaning purposes, and it would not have been obvious to backwash the filter bed of Nebolsine in the manner of Maxson. Nebolsine's purpose of the addition of air in this process is to increase the level of dissolved oxygen in the filtrate discharged into seawater to ensure that marine species in the area of the discharge will not be adversely affected, despite the presence of any remaining BOD constituents. *'477, Col. 9, lines 19 – 24.* Nebolsine is not concerned with further destruction of DOB material before discharge by cleaning the deep bed, but only increasing dissolved oxygen to the filtrate for prevention of shock to marine life residing in the area where the treated filtrate is discharged.

Therefore, since Nebolsine does not teach Applicant's method for direct filtration of wastewater, (Nebolsine requires careful narrow range screening and

coagulation prior to sending the sewage effluent to its ultra high rate filter media,) nor does Maxson, it would not have been obvious to combine an air backwash cleaning method for a filter bed to the Nebolsine invention to teach Applicant's process of direct filtration of raw sewage. Neither Nebolsine, alone nor in combination with Maxson teach or disclose Applicant's process of piping high volume, raw, unsettled wastewater directly to a deep bed filter without pretreatment other than coarse screening.

REQUESTS

In accordance with the explanations provided, Applicant respectfully requests Examiner's withdrawal of the previous rejections under 35 U.S.C. §102 and 103 and consent to allowance of Applicant's claims 1-23.

Applicant respectfully requests a telephone interview with Examiner to resolve any questions related to this response.

Respectfully submitted,

October 8, 2004

Jo Katherine D'Ambrosio
Registration No. 35,617
D'Ambrosio & Associates, PLLC
10260 Westheimer, Ste. 465
Houston, Texas 77042
Phone: (713) 975-0800
Fax: (713) 975-0995
Email: jokat@patents-trademark.com

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Compiled and Edited by

NORBERT ADOLPH LANGE, PH. D.

Lecturer in Organic Chemistry at Cleveland College of Western Reserve University; Member of the American Chemical Society, and American Institute of Chemists.

Assisted by

GORDON M. FORKER, B. S. (CHEM. ENG.)

Harshaw Chemical Company, Cleveland, Ohio

with

AN APPENDIX OF MATHEMATICAL TABLES AND FORMULAS

by

RICHARD STEVENS BURINGTON, PH. D.

Associate Professor of Mathematics at Case School of Applied Science

FOURTH EDITION REVISED AND ENLARGED

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U. S. SIEVE SERIES
U. S. Bu. Standards, Standard Screen Series, 1919

Sieve No.	Meshes per Lineal		Sieve Opening		Wire Diameter		% Tolerance in		
	inch	cm.	inch	mm.	inch	mm.	Average Opening	Maximum Opening	Wire Diameter
2.5	2.58	1	0.315	8.00	0.073	1.85	1	10	5
3	3.03	1.2	0.265	6.73	0.065	1.65	1	10	5
3.5	3.57	1.4	0.223	5.66	0.057	1.45	1	10	5
4	4.22	1.7	0.187	4.76	0.050	1.27	1	10	5
5	4.98	2	0.157	4.00	0.044	1.12	1	10	5
6	5.81	2.3	0.132	3.36	0.040	1.02	1	10	5
7	6.80	2.7	0.111	2.83	0.036	0.92	1	10	5
8	7.89	3	0.0937	2.38	0.0331	0.84	2	10	5
10	9.21	3.5	0.0787	2.00	0.0299	0.76	2	10	5
12	10.72	4	0.0661	1.68	0.0272	0.69	2	10	5
14	12.58	5	0.0555	1.41	0.0240	0.61	2	10	5
16	14.66	6	0.0469	1.19	0.0213	0.54	2	10	5
18	17.15	7	0.0394	1.00	0.0189	0.48	2	10	5
20	20.16	8	0.0331	0.84	0.0165	0.42	3	25	5
25	23.47	9	0.0280	0.71	0.0146	0.37	3	25	5
30	27.62	11	0.0232	0.59	0.0130	0.33	3	25	5
35	32.15	13	0.0197	0.50	0.0114	0.29	3	25	5
40	38.02	15	0.0165	0.42	0.0098	0.25	3	25	5
45	44.44	18	0.0138	0.35	0.0087	0.22	3	25	5
50	52.36	20	0.0117	0.297	0.0074	0.188	4	40	10
60	61.93	24	0.0098	0.250	0.0064	0.162	4	40	10
70	72.46	29	0.0083	0.210	0.0055	0.140	4	40	10
80	85.47	34	0.0070	0.177	0.0047	0.119	4	40	10
100	101.01	40	0.0059	0.149	0.0040	0.102	4	40	10
120	120.48	47	0.0049	0.125	0.0034	0.086	4	40	10
140	142.86	56	0.0041	0.105	0.0029	0.074	5	60	15
170	166.67	66	0.0035	0.088	0.0025	0.063	5	60	15
200	200	79	0.0029	0.074	0.0021	0.053	5	60	15
230	238.10	93	0.0024	0.062	0.0018	0.046	5	60	15
270	270.26	106	0.0021	0.053	0.0016	0.041	5	60	15
325	323	125	0.0017	0.044	0.0014	0.036	5	60	15

BRITISH STANDARD SCREEN SCALE SIEVES
British Engineering Standards Association

Meshes per Lineal		Sieve Opening		Wire Diameter		Standard Gauge	Tolerance Average Aperture ± %	Approx. Screening Area
inch	cm.	inch	mm.	inch	mm.			
5	1.97	0.1320	3.35	0.068	1.73	15.5	3	44
6	2.36	0.1107	2.81	0.056	1.42	17	3	44
7	2.76	0.0949	2.41	0.048	1.22	18	3	44
8	3.15	0.0810	2.06	0.044	1.12	18.5	3	42
10	3.94	0.0660	1.68	0.034	0.864	20.5	3	44
12	4.72	0.0553	1.40	0.028	0.711	22	3	44
14	5.51	0.0474	1.20	0.024	0.610	23	3	44
16	6.30	0.0395	1.00	0.023	0.584	23.5	3	40
18	7.09	0.0336	0.853	0.022	0.559	24	5	36
22	8.66	0.0275	0.699	0.018	0.457	26	5	36
25	9.84	0.0236	0.599	0.0164	0.417	27	5	35
30	11.81	0.0197	0.500	0.0136	0.345	29	5	35
36	14.17	0.0166	0.422	0.0112	0.284	31.5	5	36